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Science News-Letter

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ETHNOLOGY—ENGINEERING

History of Lighting Traced by Science

By MARJORIE MACDILL

The really important advances in the history of lighting can be quite comfortably squeezed into the last 150 years. Back of that stretch centuries and centuries of fumbling in semi-darkness.

The first torches of which human knowledge has any record are some charred sticks excavated at Vareze, France, which are believed by some archaeologists to date back 100,000 years. Such crude makeshifts as these stand at one end of the scale of the development of light, which has its present culmination in the incandescent lamp of 30,000 watts, used to illuminate the camera postures of the czars and queens of Hollywood.

From little bits of information collected here and there throughout the world for a period of over forty years, Dr. Walter Hough, head curator of anthropology at the U. S. National Museum, has pieced together a panorama of the history of illumination that reaches back from the great white ways of the present into the dark era of paleolithic time.

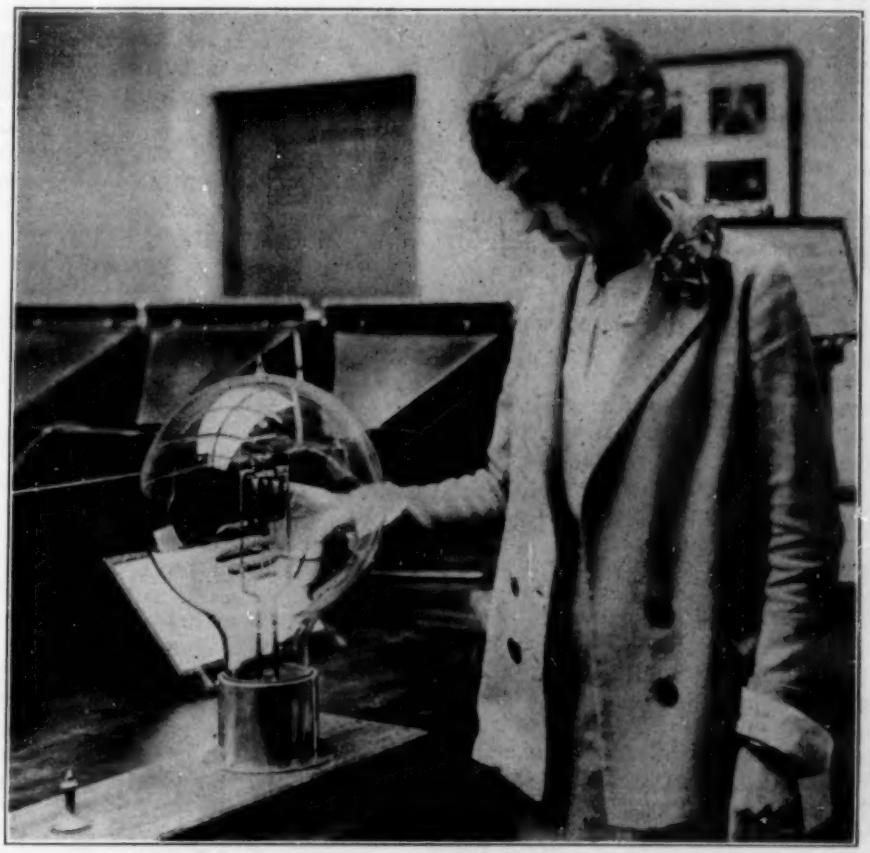
The Cave Man's Torch

For untold centuries, he says, the torch was the only supplement to the family fire for lighting purposes that man had. When the low-browed Neanderthal had to do an emergency job of fine mending on his spearhead at night in order to be ready for tomorrow's hunt, a blazing pine knot thrust in a crevice in the rock over his head gave the needed illumination. It has even been questioned by some authorities whether fire itself did not have light for its primary purpose rather than heat.

Because of the longer nights, all the higher types of illumination have developed in the temperate zone. Most of the natives of the tropics are still in what might be called the torch and candle stage of culture, Dr. Hough points out, as were all the tribes of North America when Columbus arrived, aside from the Eskimo. For the long sunless winters and the abundance of seal and walrus blubber for fuel brought about among the primitive people of the Far North an early development of the lamp, a manifestation of culture that normally appears rather late in the evolution of a race toward civilization.

Pine was the favorite wood for torches, but almost any natural object, fat with oil or resins, was likely to be turned into a source of light. In the West Indies, a resinous palm was used. In the South Seas nuts from the candlenut tree were strung together and burned to make a light for fishermen to see by at night. In the Marquesas Islands these strings of lights are employed as a rough measurement of time. The candlefish of the Arctic is another example of unusual light fuel. The fish is almost entirely fat, and when it is dried a strip of cypress bark is drawn through it with a wooden needle for a wick. This makes it a sort of hybrid between the torch and the candle. Explorers tell us that it burns steadily

(Just turn the page)



THE LATEST ACHIEVEMENT OF THE LAMP MAKER. An electric incandescent lamp using 30,000 watts of power, as compared with the 40 watts of our household lamps. Such lights as these furnish illumination for airplane landing fields and motion picture studios.

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History of Lighting

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and furnishes a good light to read by when inserted in a holder made of a cleft stick. Even today the natives of the Orkney Islands use the very oily body of the bird known to sailors as the stormy petrel in the same way. They insert a wick in the bird's beak and it burns merrily, though smoking, making a useful extempore torch that borders on the abstract principle of the lamp, for the body of the dead bird acts as a reservoir for the fat that the burning wick melts down.

Candles Came Late

Candles proper belong to a relatively high stage of culture, according to Dr. Hough. Countless centuries passed before the mind of man was able to cope with the complex idea of making an illuminant by inserting a wick in a mass of solid fat. It was well on in the Bronze Age, about 4000 years ago before candles finally appeared. Keeping a combustible fat solid enough to support a wick involves the important factor of temperature. This in turn drags in the elements of climate and altitude. One does not look for candles in a country where all the fats available either from domestic animals or wax-yielding trees or insects, melt immediately down into oil. An imaginary "oil and butter" line has been drawn around Europe above which fixed fats occur and below which oils prevail. Below this line, in Italy, the lamp which used oil for fuel developed early. The manufacture of lamps and the oil to supply them was an industry of sizable proportions, while the banquets of Teutonic chieftains were still lighted with smoky flambeaux. The Romans did use a candle, however, but it was made of wax with wicks of papyrus or rushes dipped in pitch. Wax melts at a considerably higher point than tallow and consequently has a more widespread use in warm countries.

Candles may be divided into two

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News-Letter Features

Born over four years ago of the demand and interest of those individuals who had caught a glimpse of *Science Service's* news reports to newspapers, the Science News-Letter has since proved interesting to laymen, scientists, students, teachers and children.

Into the pages of the News-Letter are fed the cream of *Science Service's* output directed at the newspapers of the world. To this is added material especially prepared.

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Photographs aid in the telling of the week's science.

Great care is taken to keep its editorial content not only *interesting* but *accurate* as to fact and implication.

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Bird Baths Attract Feathered Friends

The material on this page is furnished by the Coordinating Council on Nature Activities.

People are not aware of the fact that birds bathe frequently, especially in warm weather. In cities and towns and even in the country during the hot, dry weather, birds have trouble in finding water enough for drinking and bathing, for we must not forget that at the time of the breeding season, most of our songsters remain in the neighborhood of their nests.

Bird baths should be erected in the open where there are no places for prowling cats to hide and pounce upon the visitors. It is all the better if they can be located in full view from a window for many little incidents are pretty sure to take place—little happenings in bird life that we would not want to miss. I think I can truly say that the bird bath shown in the accompanying photograph, which was built by the writer, has given us more real pleasure and enjoyment than anything else about the lawn.

When I began to think about building a bird bath, the first thing was to look around for material. Not far away was a pile of glacial drift containing round smooth stones or pebbles of white and reddish quartzite, granite variously mottled, and quartz conglomerate or pudding stones—the best material in the world for such a structure. For many years I had been a collector of minerals, and had in my attic, duplicate specimens picked up in many States of the Union. These were of various hues from the bright blue and green ores of copper to pink pelspar and black hornblende. Many of these were worked into the bird bath with pleasing effect. A fossil now and then added interest to the structure.

The foundation, or that part beneath the surface of the ground should be as wide as the base itself and at least a foot deep. Any kind of broken stone will serve for this part of the structure. The material should be thoroughly mixed with cement, forming a concrete base. The mixture should contain about four parts of broken stone to two of sand and one of cement.

When the excavation is made, but before the foundation is put in, a slender, straight but rigid stick should be placed in the center, perpendicular, and almost as high as the pedestal. The handle of a broom would be good, but a straight iron rod might be better. This gives strength during construction and a means of getting the pedestal perpendicular and uniform in width.

A HOME-MADE BIRD BATH

In the bird bath that I built, the pedestal is about 30 inches from the ground to the base of the bowl and about ten inches in diameter. It gets slightly narrower toward the tip. With a ruler, measuring out from the rod in the center, it was easy to keep the column uniform and circular. The brightly colored minerals were placed as to give the best effect. The base for the first few inches above the ground is wider to balance the bowl.

The making of the bowl is the most difficult task. At first I tried a wooden form which proved a partial failure. I then thought of the following plan and made a bowl that has given the best of service. A sheet of heavy paper was placed on a smooth surface and a circle drawn 14 inches in diameter. This, then, was the width of the inner surface of the bowl. From the same center I drew around this another circle 20 inches across, limiting the outer surface of the bowl. The ring between the two circles was three inches wide. Pieces of newspaper were soaked in water and rolled in tight balls, then placed in the inner circle, piling them up, forming the shape of the bowl. Between the circles I placed thin pieces of stone, minerals and fossils, best face down, and then covered them and the paper with the cement mixture—two parts of sand and one of cement. Numerous small pebbles were stuck in the soft cement to break the smooth surface. The bowl was probably not an inch and a half thick anywhere. The moist paper within prevented too rapid evaporation and the outside was sprinkled and covered to keep it from drying out too rapidly. Two days later the bowl was turned over and the paper taken out. It was still soft enough for me to scrape off the uneven particles within. Fresh cement was placed on the pedestal, the bowl placed on it, leveled up and filled with water.

I worked, into this bird bath, rocks and minerals that recall many walks and visits. As the birds alight to drink or bathe, they stand on pieces of red and gray sandstone, picked up by John Burroughs, and given to me while we were walking over the fields of his old home farm at Woodchuck Lodge. The birds like it just as well for all that, and I like it better.

This structure has now stood for three years without a crack or flaw. When the ground is covered with snow it is often used as a feeding station. I have taken a hammer and broken the ice when it covered the surface half an inch thick and not two minutes later starlings and blue-jays waded in the icy water and took a bath.

Just now, June 21, I happened to look out of the window and discovered a mother robin and her three young at the bird bath. The young are easily told by their mottled breasts. All three got in the water at one time, while the mother watched on from the edge. When they finished, she got in and splashed about.

This bird bath is erected near the center of a residential section of a large town, yet nearly twenty-five species of birds came to drink or bathe. They include the oven-bird, flicker, wood thrush, hermit thrush, veery, olive-backed thrush, gray-cheeked thrush, field sparrow, song sparrow, white-throated sparrow, tree-sparrow, yellow-billed cuckoo, red-eyed vireo, catbird and parula warbler. How many others came when we were not looking would be interesting to know.

—Oliver Perry Medsger,
Woodcraft League of America.

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An American expedition to remote sections of Persia hopes to bring back specimens of the Persian wild ass and other rare beasts common in Biblical times.

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L. Sidlo, Cleveland, Ohio.

ORNITHOLOGY

Bird Photography

Birds, as you know, are shy creatures and seem to have a pet aversion to being photographed. You must have some method to lure them to your camera. There are three things that you can play upon—hunger, thirst and love of the nest and young.

The first can be used only in the winter, when food is scarce. Put out a bird lunch-counter, a board fastened to a tree is probably the best, and on this put grain, nutmeats, suet, raisins and pieces of bread.

In the first winter of my enthusiasm for birds I concocted the idea of running a lunch counter on a little pulley from my bedroom window to a nearby tree. The wire on which the lunch counter ran slanted downward and I pulled the counter back with a string. Each day I pulled the counter a little closer to the window, so that at the end of two weeks I had chickadees and nuthatches eating off the window sill.

Finally, I decided that it was time I started photographing these birds. One Saturday, as a result of almost a whole day's waiting, I made one really good picture of a chickadee at the lunch counter. It was my first bird photograph. I had it enlarged, I showed it to everyone, I gazed at it day in and day out until it was almost worn out. Even today I cannot look at it without a little thrill of pleasure at the memory of my joy over this first achievement.

When spring came I put out a bird bath, and along in May, when the weather got hot, it had many visitors. One day I focused my camera on it and waited inside the house, ready to pull the string which released the shutter. A catbird glided furtively near, then perched on the edge of the bird bath and drank. When I snapped the picture he jumped at least three feet in the air and refused to come near again for days afterward. A pair of goldfinches came and I photographed them; and later in the afternoon the shy and elusive woodthrush drew close and finally came to drink. It was a thrilling day, and my pictures turned out surprisingly well.

Now I come to photographing birds at the nest. In this you will get on more intimate terms with birds than in any other way and also you will gain some knowledge of their home life. It is enchanting work, although it requires patience.

First, of course, you must locate the nests, and this you soon become adept at doing. When a bird starts nervously scolding you for any length of time or if one stands about holding food in its beak, you can be pretty sure that a nest is nearby. It is well to know where the different birds build their nests, so as not to look for the nest of a tree-building bird on the ground or vice versa. After the nest is discovered, you set up your camera, attach a string to the shutter and wait a short distance away, ready to pull the string (thus releasing the shutter) when one of the parent birds comes to the nest. In this you must make as little disturbance as possible, for there is always the danger of causing the parent birds to desert the nest. Make slow, noiseless movements, break away as few branches as possible (it it better to tie them back), make yourself and the camera as inconspicuous as you can. You will find that it is much easier to get pictures when the eggs have hatched and the young are in the nest.

The vireo are very tame, but their nests are difficult to find. Some children found a vireo nest for me in a lilac bush. The tiny mother bird was absolutely indifferent to the camera. However, now and then she cocked her exquisite little head on one side and rasped out a few scolding notes.

Taking a scissor-tail's picture caused me a good deal of perspiring effort. I found the nest in a lone catalpa tree on the prairie, and for four consecutive scorchingly hot July days, I lay waiting for the scissor-tail to condescend to be photographed. On the fourth day I climbed up and down the catalpa tree fourteen times and snapped the camera twelve times, all of which resulted in two really good pictures and a goodly number of freckles on the photographer's nose.

A red-headed woodpecker, after shrieking and yelling his very unfavorable opinion of me for at least two hours, finally gave up in disgust and allowed himself to be photographed.

Interesting photographs can be made of the nests themselves. Ground nests containing eggs make charming pictures, but these are difficult to find—you come upon them usually by accident. One time when walking in a field, a bird darted up from between my feet and on stooping down I found the nest of a lark sparrow. I set my camera on a tripod, took a time exposure and then hurried away, so that the mother bird would return and the eggs would not become chilled.

Then you can make pictures of the young birds after leaving the nest. In late May I found a family of baby chickadees just after breaking home ties. There were six of them to start out with, but I photographed only two. Posing even a couple of self-willed baby birds is a difficult proposition—just try it.

—Lorene Squire,
Camp Fire Girls.

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Nature Coordination

Realizing the need for a national program that would coordinate the nature activities of national groups working with young people, the American Museum of Natural History invited these volunteer organizations to form a council to be known as the Coordinating Council on Nature Activities for the purpose of teaching the growing generation, through nature activities, the value of all wild life and natural resources and their conservation.

The various organizations represented are as follows:

American Museum of Natural History, American Natural Study Society, Boy Scouts of America, Camp Directors Association, Camp Fire Girls, Inc., Girl Scouts, Inc., Pioneer Youth of America, Playground and Recreation Association, Woodcraft League of America.

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Two small islands in the Pacific have been made bird reservations by an executive order.

The troublesome barberry which spreads black stem rust to grain fields was once valued because of the medicinal uses of its roots.

German police are using a specially equipped automobile to rush materials needed for investigation and first aid to the scene of a crime.

EUGENICS

Studies Race Mixture

Providing the original stock is sound, inbreeding among human beings results in no deterioration, physical or mental. Nor does mixture of widely differing races produce an inferior type.

Such are the conclusions of Dr. Harry L. Shapiro, ethnologist of the American Museum of Natural History, from recent study of the inhabitants of Norfolk Island, a small island north of New Zealand. They are Tahitian-English half-castes, whose history dates back to the mutiny of the crew of the ship Bounty in 1789. At present there are more than 600 of these islanders and they are the descendants of twelve Tahitian women and nine Englishmen, part of the mutinous crew.

In 1789 the crew of the Bounty, a vessel sailing in the southern Pacific, mutinied, casting the captain adrift in a small boat and making for Tahiti. Here nine of the crew, fearing capture, sailed to Pitcairn, a small uninhabited island east of Tahiti. They took with them twelve Tahitian women and nine Tahitian men. On Pitcairn the women were divided among the Englishmen as wives. The Tahitian men were allowed no women. This led to jealousy and the Tahitian men were killed, leaving no descendants. The Tahitian women and the Englishmen, all of them sound stock, established a line of half-castes. They were completely isolated and they multiplied rapidly.

By 1856 the population was too great for the small space of Pitcairn. More than 150 moved to Norfolk Island, which was at that time uninhabited. Today there is a population of 600 on Norfolk Island and 175 on Pitcairn, all the descendants of the original Tahitians and English. It is of the Norfolk Islanders that Dr. Shapiro has made a study.

Dr. Shapiro has found these islanders to be of sound physique, taller than the average English and Tahitians, and of good mentality. There is only one feeble-minded person, he said, on Norfolk Island. Their education has of necessity been rudimentary for generations, but they are now provided with teachers by the Australian government under the jurisdiction of which they come. And the teachers are getting excellent results.

Thus, according to Dr. Shapiro, the Norfolk Islanders prove that, when the stock is sound to begin with, intensive in-breeding makes for no de-

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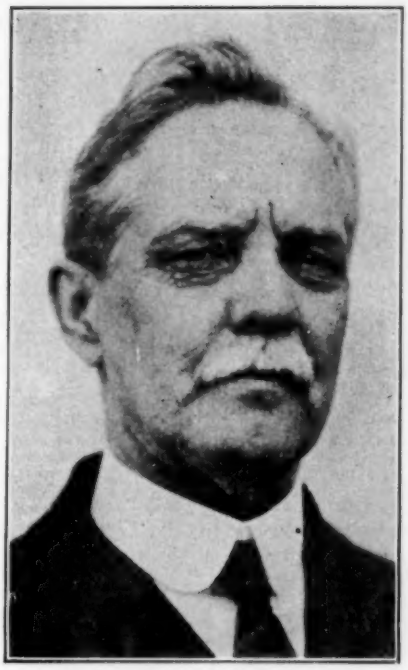
PHYSICS



DAYTON CLARENCE MILLER

Physicist and Flutist

Like many great scientists, Dr. Miller has another side to his character. He is a musician. His specialty is the flute and the organ. But he is more than merely a skilled performer, for if you visit him at Cleveland, he is just as likely to show you with equal enthusiasm the phonodeik, the interferometer, or his collection of flutes.

The first is an instrument of his own invention for photographing sound waves, including those from his precious flutes. The second is the instrument which others have used to attempt to measure the motion of the earth through the ether. The failure of Prof. Michelson to detect any such ether drift when he performed the experiment many years ago was one cause which led to the theory of relativity. And lately Dr. Miller has repeated the experiment, at Mt. Wilson and at Cleveland, to see what it does give, if one does it without any previous expectations of what he might get.

Finally, the third of his treasures, the collection of flutes, may really be the most important in the back of his mind, for that is his hobby. Who doesn't think his hobby a bit more important than his work, even if he won't admit it? The chief of the collection is a flute of gold.

Dr. Miller was born in Strongsville, Ohio, on March 13, 1866. He is a graduate of Baldwin University and Princeton, for he took his D. Sc.

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PSYCHOLOGY

Freud Still Active

By SANDOR FERENCZI

Dr. Ferenczi is a noted psychoanalyst of Budapest, and associate of Sigmund Freud.

Sigmund Freud, who has devoted forty years to psychoanalysis in the face of opposition from all sides, is now past his seventieth birthday, but he is as hard at work as ever. Many false reports have been circulated in America regarding his illness. The fact is, that three years ago he was successfully operated on for a malignant condition of the jaw. Recovery has been complete and most satisfactory, and now, in spite of advanced age, he is in full vigor of body and mind.

Each year he publishes a new scientific work. Lately he has tried to sum up, to synthesize, the enormous quantity of his psychoanalytic observations. Freud is never narrow or orthodox, as are some of his former pupils. He does not hesitate to alter his conceptions freely, provided new experiences and observations compel him to do so.

No recent intellectual movement has been so badly misunderstood and distorted as the psychoanalytic movement originated by Professor Freud. Quite by accident of circumstance it fell to the lot of Freud to revise our knowledge of the sexual life of man and its development, a field of science neglected for generations. Freud, by his extensive experience in clinical psychology and by the introduction of new methods of observation, such as dream interpretation and free-association, was able to place it on a firm foundation.

As a consequence of these endeavors everybody identified psychoanalysis with sexuality, i. e., accusing it of pan-sexuality. This is entirely false. Freud has from the beginning referred the origin of nervous disorders to a *conflict* between the instincts and *ethics*. In this conflict he found the ethical force to be the stronger.

The last five years he has devoted to a more close analysis of the ethical forces. From this study has arisen what he calls the "Ego psychology," by which he demonstrates the source and significance of the feeling of guilt, the social fear and mass psychology. These he has explored to a heretofore unsuspected depth after having completed his sexual theories. And throughout all his studies he has never neglected to point out the relationship of the psychoanalytic field of activity to those concerning theology, art, pedagogy, character study and all those more or less elaborated phases

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Freud Still Active

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of applied psychology. All of these were enriched in unanticipated ways by psychoanalysis. Finally, he has also succeeded in finding for the first time points of contact between introspective psychology and the natural sciences, especially biology.

It is true that he had to attach a higher significance to the sexual instincts than had been hitherto permitted by the prudery of earlier generations, from which prudery no science escaped. But still, his conception of sexuality is broader than those preceding him, and he has been able to connect Platonic ideas to Eros, and so to bring the most tender and high spiritual relationships of human beings and things to the "pleasure principle."

Until 1909 Sigmund Freud worked practically alone—only a small group of less than a dozen members gave him support. He thanks America for his first official recognition. This occurred in 1905, when Dr. G. Stanley Hall, president of Clark University and founder of the American Society of Psychology, invited him to the foundation festival of his university. Several of Freud's pupils, with whom I was included, accompanied him to that festival. The impression left by his series of five lectures was deep and enduring.

Now, after 20 years have passed, I have again visited the United States. I have been agreeably surprised to note that knowledge of the principal ideas of psychoanalysis exists in much wider circles here than in Europe. This understanding is quite superficial in America, while in Europe it is more solidly founded, owing to the existence of several special institutions devoted to the deeper study of this science. In 1910 we founded the International Psychoanalytic Association, which now has branches in Vienna, Berlin, Budapest, London, the Hague, Paris, Moscow, New York City, Calcutta and Zurich. In Vienna and London we have our own publishing firms engaged in printing reliable psychoanalytic literature and three journals.

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An investigation among monks in England who eat no meat indicated that vegetarians are not immune to cancer.

A new machine to test the wearing qualities of paper when it is wet has been devised at the U. S. Bureau of Standards.

Physicist and Flutist

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degree at the New Jersey institution in 1890. Since 1893, he has been professor of physics at Case School of Applied Science in Cleveland. Recently he was made chairman of the Division of Physical Science of the National Research Council for the next year, and so during the coming winter Washington scientists will have the pleasure of having him in their midst a large part of the time.

Science News-Letter, July 9, 1927

MEMORANDUM

This blank space serves a dual purpose. It allows you to clip out the article on the reverse of this page without destroying any other article. It can also be used for notes and the recording of your own observations.

Studies Race Mixture

(*Continued from page 21*)

crease in stamina. Likewise, race mixture, in his opinion, brings no deterioration.

The idea that the half-caste is inferior, he maintained, comes largely from the fact that pure races have always looked down on the half-caste. In Norfolk Island, he said, the half-caste has a chance to show his worth, for there is no discrimination against him, as the entire population is half-caste. And Norfolk Island, he pointed out, is one of the only places in the world in which no stigma is attached to half-castes.

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Camphor can be made artificially from turpentime.

The Eiffel tower in Paris contains 7,000 tons of steel.

The fastest growing vine is said to be the moonflower.

A single peony may produce 3,500,000 grains of pollen.

Rubber floor mats are made from old automobile tires.

The Philippines had a university before the Pilgrims came to America.

Bats are the only mammals that can make sustained flights in the air.

A huge airtight tank in which an entire railroad car can be disinfected is used in Germany.

So-called "waste lands" of Ceylon are now sold for as much as $180 an acre to tea planters.

Grasshoppers fried in lard with cloves or garlic are eaten by people in some parts of the Near East.

A dinosaur from Africa now being assembled in London is expected to be over 90 feet long and 20 feet tall.

A new ceramic material which can be heated up to 700 degrees and then immersed in cold water without cracking has been produced in Germany.

A French scientist, Charles Perez, has been honored by the French Academy for discovering the process by which a caterpillar turns into a butterfly.

If workers in tobacco fields smoke or chew they may infect the crop with the tobacco mosaic disease, unless they use heat-sterilized tobacco.

History of Lighting

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classes. The first is the taper, which is made of cord or wick covered with wax, forming a flexible length coiled up in a vessel or around a support. The second is the rigid candle, with which we are all familiar. Though unknown to most of the present generation, the taper coiled into fanciful shapes at a comparatively recent date was still used to light backwoods dances in remote sections of the mountains in Virginia and Tennessee, says Dr. Hough.

Tallow candle dipping and molding were home industries in early American households, and in spite of being superseded from the point of view of efficiency, pink teas, interior decorators and tenants of would-be studios keep the commercial industry of candle-making still on its feet. It is probably bolstered up also by the present vogue for antique candlesticks, snuffers and all the accessories of grandmother's time, on which craftsmen of the period lavished their attention.

Evolution of the Lamp

The first lamps were crudely hollowed-out stone saucers or sea shells, extemporaneously made into oil containers. Sometimes the skull of an animal was pressed into service to hold the illuminating grease. The next step was to elaborate a lip on the edge of the rude saucer to hold the wick. This eventually developed into a projecting spout, through which the wick was inserted. A handle and a cover for the oil reservoir followed in due course after widely separated intervals of time, as the different races struggled to make light for themselves through the long non-inventive period in man's history.

Millions of lamps, however, of this simple construction were manufactured of terra cotta and bronze during the Graeco-Roman era. Designed in accordance with the artistic taste of this classic period, many of them are objects of great beauty. The use of the Roman lamp became widespread throughout the whole Mediterranean region around 300 B. C., and formed the basis of one of the greatest developments in the history of illumination. Rome achieved a stage of prosperity at that time, according to the Roman naturalist Pliny, that assured an excess in the oil supply that had previously all been needed for food and permitted its use for fuel. Better agricultural skill brought about greater yields of grain and olives, while Roman engineers improved the olive mills and presses until they extracted the maximum of oil from the grist. They could be used, and often were, for other sources of oil than olives, such as nuts and seeds.

In the tomb of Tut-Ankh-Amen were several examples of the float lamp, an interesting type of illumination that saw widespread use at different times during antiquity. The wick, instead of being anchored to the side of the lamp, floated on a bit of cork on oil, which in turn floated on the surface of a bowl of water. The light naturally was very feeble, but would last a long time, burning a minimum of fuel. On account of the water the fire hazard was small, so that it was propably used in places such as corners in dark stairways, where only a small amount of illumination was needed all the time. They were burned before altars in many countries and made an ideal night light in sick rooms. The National Museum collection contains a beautiful chandelier of hanging float lamps of intricate metal work that came originally from Morocco.

THE ITALIAN LUCERNA, the most beautiful lamp ever designed. It stands midway between the lamp of antiquity and the gravity pressure lamps of the nineteenth century.

Gravity Pressure Lamps

"The link in the chain of lamps from the Roman period to the period of enlightened invention is the Italian lucerna, the most beautiful and graceful lamp ever designed," says Dr. Hough. "The lucerna is made of bronze, brass, or terra cotta, and consists of a reservoir with from two to four spouts and an upright stem with a base on which the perforated reservoir can be raised or lowered. When the reservoir is full there is a slight gravity head on the oil, not conclusively intentional, but which might suggest an improvement to an observing mind.

"There follow in this apparent line lamps patently designed to furnish oil to the wick under gravity pressure. These slanting long spout lamps in brass and copper were in use in Belgium, France and other countries of northern Europe. Many were brought by immigrants to the New World. In the beginning complexities of researches ushering in the inventive period, many experiments were carried on by men whose minds belonged to a new age. The needs for more light were stressed by growing cities, navigation, commerce, occupations and the vast ramifications of social intercourse. By this time the prospect of remuneration was added stimulus to invention.

"The effective lamp required the services of chemistry, physics, mechanics, the industrial arts and sciences, and only by their progress was it possible to transform the greese cup, which our ancestors thought the last word in lighting, into an efficient illuminating apparatus. About 1780, tubular wicks furnished complete aeration and the burner was given draught by openings under the flame, a principle long before incorporated in the stove. The draught was brought up through the burner, aerating both sides

(*Just turn the page*)

History of Lighting

(*Continued from page 23*)

of the flame and doing away with the center of incombustion."

The Swiss engineer Argand is to be given credit for the advanced lamp, according to Dr. Hough, his particular contributions being the perfected burners and an increased draft by the addition of the cylindrical chimney. Lamps like this, however, were articles of luxury and affected the slowly developing lighting appliances of the people but little. George Washington possessed several lamps of the Argand type, but there were only a few scattered through the houses of the wealthy in America at the end of the eighteenth century.

Petroleum, Gas and Electricity

By the time of the Civil War, the use of petroleum had become general, and two-tube lamps mounted with ventilated burners with a flat wick and glass chimneys became common. At the Philadelphia Centennial Exhibition, in 1876, a lamp was exhibited with a tubular woven wick with center ventilation and a glass tubular chimney that had an expanded air chamber at the base. This was the beginning of a long line of lamps that achieved the highest illuminating results from petroleum. The rather quaint little hand lamps with flat wicks were relegated to the cellar or the attic by the advent of befrosted crystal fringed circular burners, that presided in dignity over many a parlor from the secure enthronement of mother's best center table. They are vanished now into the limbo of the whatnot and the tidy but the antique hounds have rescued the small hand lamp from oblivion. Any that escaped being thrown out on the trash pile during the housecleaning orgies of orderly great aunts, not infrequently bring from $2 to $10 apiece in Ye Olde Dominion Antique Shoppe and its hosts of competitors.

The economic utilization of gas is quite clear cut, unlike so much of the history of cultural development. In 1732 a man named Murdock, in England, experimented with the production of gas from various substances and finally lighted his own house with coal gas. In 1797 he lighted the Soho manufactory at Birmingham with the same fuel, while in 1803 the Lyceum Theater in London and a cotton factory in Manchester were also lighted with it. From these early pioneers there was rapid progress. Gas was first used in the United States in Baltimore in 1821, thereby beating New York by a half dozen years, that metropolis not putting it in until 1827.

The early experiments with electricity in the nineteenth century led up to the production of the incandescent lamp by Thomas Edison in 1879, which brought electric light into the home. From that time forth the progress of electricity in lighting has been steadily forward. Where it will stop, there is no means of foretelling.

Baku Centers of Fire Worship

The first recorded use of natural gas took place in a Parsee fire temple near Baku in the seventh century. This part of the Caucasus, toward which the faces of the oil interests are at present set, was the center of the fire worship of the Magi. The natural gas was discovered when a well became dry and the owner threw down a piece of lighted tow in order to see the bottom. The mouth of the well immediately burst into flame and continued to burn until a few years ago. A temple was built over the ever-burning well, which was attended by priests as late as the last century. Ironically enough it is protected, or was until a quite recent date, from destruction by an oil company, exponents of a more modern worship of the Great God Gasoline.

According to Marco Polo, the great mediaeval traveler, the natives burned naptha for light around this region in the thirteenth century. In general, however, mineral sources of light were not utilized till modern times. Fish oil was used more extensively for lamps than animal fats because it stayed liquid in cold climates. Small fish were used first for this purpose, and then as man became more inventive and aggressive, he went after the larger ones. The great whaling industry developed in response to a demand for a better supply of oil, and the introduction of petroleum is probably the only thing that saved the great cetaceans from extinction.

Ever-Burning Light

"A vast amount of myth and pseudoscience have accumulated around the idea of a perpetual lamp that would burn indefinitely without replenishment," Dr. Hough declares. "Earnest search was made by the alchemists and even more modern chemists for such a desirable illuminant. Stories were prevalent of finding such lamps in tombs, attributing to a past age knowledge of this mysterious fuel. Ever-burning lamps in shrines and temples abound in history, analogous to the sacred fire kept burning by the vestal virgins of Rome. There is a record of a light in Townley Chapel, in England, said to have burned for over a thousand years."

The custom of lighting the dead with candles or a lamp, says the well-known ethnologist, is widespread among many races, the general underlying idea being to help light the way along the unknown path of another world. For in a sense light was thought to have the magic power to penetrate the mysterious veil of death.

Science News-Letter, July 9, 1927

MEMORANDUM

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ATHLETICS—PHYSICS

New Time For 880?

Star athletes looking for a chance to break a world's record on the running track should tackle the 880-yard run.

This suggestion comes not from a coach or trainer but from recent calculations made by Dr. Earle R. Hedrick of the University of California, editor of the *Bulletin of the American Mathematical Society*. According to Dr. Hedrick's diagram of the situation, the record of 1 minute 52 seconds, made in the 880-yard race represents the least worthy performance among the recognized world's record races from the hundred-yard dash to the two-mile run. It is reasonable on this basis to expect somebody to cut five seconds from the present record without setting a new standard of human strength and endurance. On the other hand, it is considered unlikely that aonyone will lower the record of 47.4 seconds for the 440-yard curved-track race.

Adopting the rule that fatigue bears a direct mathematical relation to distance traveled, Dr. Hedrick was able to draw a smooth logarithmic curve which tells at a glance what a record performance should be in a race of any distance above 100 yards. The shorter races are not considered because of the relatively great errors due to the time of getting started. In his diagram the mathematician finds that the 220-yard, the 440-yard, and even the 100-mile record all fall nicely on an orthodox line and are thus tentatively assumed to indicate a maximum human performance. At least no record in any other race is better. The 880-yard and mile records, however, run as much as five seconds too high. Inasmuch as the 880-yard distance is the shorter of the two, the deviation here has the most significance of any recorded. Unless there is some physical factor, still unknown, which should enter the mathematical equation, the 880-yard mark looks to be the easiest of conquest.

An important use of this athletic diagram comes in the attempt to evaluate European records based on races run with metric measurement. A 1000 to 1500 meter race, which calls for a degree of fatigue not corresponding exactly to any American race, is thus readily checked and appraised. The suggestion has been made that an athletic prize should be awarded to a runner not for breaking some odd record that happens to be extant, but rather for convincing the sporting mathematician that he can

(*Just turn the page*)

ELECTRICITY

Cable Works as Push Button

A new type of electric cable for small currents, such as those used for sounding bells and buzzers and for starting and stopping machinery, has been invented by a Hungarian electrical engineer of Berlin, Oscar Nagy. It does away with the necessity of having push buttons at set points, for if the cable is squeezed at any place throughout its length the circuit is completed and the current does its work. This is accomplished by having the wires woven into a sort of loose braid, separated by an elastic non-conductor, which permits contact when pressure is applied.

Many uses are suggested for the new cable. It is expected to find a large use around complicated machinery, where threatened accidents to either operator or material demand instant stopping. Since it can be operated with feet, knees, elbows, or any part of the body, its advantage over ordinary types of switches and levers is obvious. Hidden beneath carpets or otherwise concealed, it is expected to be useful in burglar alarm systems. Strung along trenches, or along the sides of naval vessels, it will enable officers to signal to their men from any point, and by rapid successive pressures messages can be transmitted in ordinary Morse code, making it an emergency telegraph system.

An especially interesting safety application is found in its use in mines and quarries, where a fall or slide of rock automatically sounds its own emergency signal.

Science News-Letter, July 9, 1927

MUSIC

New Bow Plays Four Strings

A new type of violin bow, or rather a new rediscovery of a very old type, which permits the playing of four-part music on a single instrument, has recently been demonstrated in Berlin by a well-known virtuoso, Herman Berkowski. The bow is deeply curved instead of straight, as in the usual modern form, and the strings are left very loose. It resembles the bows shown in medieval pictures of performers on the ancient Celtic chrotta or crewth, the ancestor of the violin. It is stated that the new bow makes possible the rendition of early violin scores which have hitherto been riddles to modern performers because they called for the simultaneous reaching of strings impossible to the straight bow.

Science News-Letter, July 9, 1927

ZOOLOGY

Flood Leaves Fishes Dry

Retreating waters of the Mississippi River have begun to leave in their wake a new set of flood victims—millions of stranded fishes. Letters from residents of states along the lower Mississippi have already been received by the U. S. Bureau of Fisheries asking the bureau to come to the rescue.

The bureau is making plans for an unusually extensive program of rescue work along the lower Mississippi this summer, according to G. C. Leach, chief of the division of fish culture. The rescue crews ordinarily do most of their fish saving in the upper Mississippi region, he said today, but this year the upper Mississippi situation is not expected to be serious, as snowfall has been plentiful and this will tend to prevent rapid drying out of river beds.

Each year, wherever the water is unusually high, adult fish are carried out of the main channel of the river. They spawn in these backwaters, and when the rivers become low, innumerable young fish are left stranded in shallow ponds and depressions that rapidly dry up. Rescue crews catch them in seines and transport them to the river, thus saving the lives of from 100 million to 200 million young fish each year.

Science News-Letter, July 9, 1927

PHYSICS

Hydrogen Atoms Last

Hydrogen, one of the most common of all elements, since it is one of the two constituents of water, may survive as single atoms for longer than hitherto supposed, according to the work of Joseph Kaplan, in the Physics Laboratory of Johns Hopkins University. Ordinary hydrogen gas consists of two atoms joined together to form a hydrogen molecule, but the two atoms may be pulled apart, and in this form it has many properties not possessed by the molecules. For instance, by a method of welding invented recently by Dr. Irving Langmuir, of the General Electric Company's research laboratory, burning atomic hydrogen is used to weld pieces of metal together so that they are as strong as an ordinary single piece. It has been believed that the free atoms were only able to last for a fraction of a second. Mr. Kaplan finds, however, that the atoms may survive as long as three seconds before joining together again into molecules.

Science News-Letter, July 9, 1927

MEMORANDUM

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New Time for 880?

(*Continued from page* 25)

break over the logarithmic fatigue line that is supposed to be the border of human endurance. Under these conditions nobody would know who won a track meet until a report was handed down by the professor of analytic geometry. But the rah-rah boy, hoarsely yelling at a sprinter staggering across the finish line, probably isn't thinking in terms of logarithms.

Science News-Letter, July 9, 1927

They Say

Elwood Street, director of the Community Council, St. Louis, Mo., writes:

That Science News-Letter of yours looks like a bully stunt.

H. L. Mencken reviewing in his American Mercury a new book, "An Introduction to General Biology" by S. J. Holmes, writes:

I believe that biology is a required study in nearly all the high-schools of this great land; if so, its teaching must be in the hands of pedagogues even worse than the average of their quackish order, for biological knowledge, even of the most elemental sort, is surely not widespread among us. For proof of it, turn to the newspapers. Science, of late, has been good news: they discuss it copiously, and with a fine enthusiasm. But save when they simply reprint the excellent articles sent out by Science Service, a Washington news agency, they seldom discuss it with any intelligence. The astronomy encountered in the newspaper headlines is scarcely to be distinguished from that of astrology; the biology is that of chiropractors. When one comes to such subsidiary sciences as pathology the thing grows fantastic. Every week the Journal of the American Medical Association prints a comic section that is devoted mainly to the pathological imbecilities printed in American newspapers—and the journals represented are by no means all small ones. It is the big city dailies, indeed, that devote themselves most ardently to impossible operations, magical marvels in bacteriology, and the new cancer cures. Such "news" is not only printed uncritically, to the prosperity of quacks; it is also defaced with all sorts of astounding howlers. The average newspaper copy-reader seems to be no more halted by a piece of copy speaking of diabetes of the lungs than he is by a story referring to Bach as the author of "The Messiah."

Science News-Letter, July 9, 1927

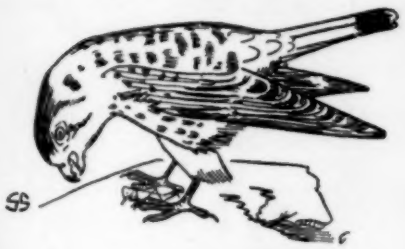
A French physician has found horse serum more effective for wound dressing than collodion.

New uses for cotton are being sought by government scientists in the hope of finding an outlet for surplus cotton production.

BIOLOGY

NATURE RAMBLINGS

By FRANK THONE



Sparrow-Hawk

The indiscriminate condemnation and persecution from which all hawks used to suffer is being somewhat relaxed of late years, and many of these swift, rapacious birds are now recognized as among the farmer's best friends. Among them all, the farmer has no greater friend than the least of the hawks—the sparrow-hawk.

The sparrow-hawk gets its name from its diminutive size, rather than from any fondness it displays for sparrows as prey. As a matter of fact, sparrow-hawks seldom offend by killing small birds or young chicks. When they want warm-blooded meat they generally take field mice, but their principal food during the warm season consists of insects. They seem to have a special liking for grasshoppers, crickets and that clan of crop-chewing pests in general, varied with big caterpillars, large spiders, bloated beetles and similar creeping things that nobody is very fond of.

The sparrow-hawk is much less shy of man and his works than are most of its larger brethren; indeed, most of its hunting is done over cultivated fields and clearings. Since it preys on small things that usually keep close to cover, it is not a lofty soarer, like its relatives, zut is given to hanging suspended over a particular point by a rapid fluttering of its wings; whence its other name of "windhover."

It has one of the widest ranges of Northern American birds, being found everywhere east of the Rockies, from the Yukon and Mackenzie basins across to Newfoundland and south to the Gulf. A closely related hawklet, the desert sparrow-hawk, covers the rest of the continent, south through Mexico into Central America.

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The Romans devised ways of replenishing depleted oyster beds.

Douglas fir trees sometimes produce lumps of a sugar which is worth over $50 a pound because one ingredient is valuable in medicine.

SOCIOLOGY

Ideas of Family Shaken

The popular myth that a "normal" family consists of two parents and three children has been taken as the basis for many discussions as to family budgets, salaries, house plans and other living problems. But this mythical family does not live in the average American city home, in Chicago, at least, according to an investigation just made under the auspices of the American Home Economics Association and the University of Chicago.

The study covers 23,373 families, some of which are childless, some having one or more children and some of which are "broken," that is, made up of one parent and one or more children. Of all these families, almost one-fourth had no children living at home when the figures were obtained. Another fourth had only one child. Practically one-fifth had two children, and less than one-third had three or more.

"The so-called normal family of two parents and three children was found in only 11 per cent. of the families studied," the preliminary report of the investigation states.

Considering the actual number of children that must be provided for in these families, the data show that "more than two-thirds are in families which have three or more children. In other words, were each family to receive an income sufficient to support four members, more than two-thirds of the children would be inadequately provided for, since they would be in families of more than four members."

The study which aims to add to the meager statistical data available on the American family shows the important economic point that in a four-child family the parents carry the burden of child care and dependency over an average period of 24 years. During seven years of this time one child is cared for; during another seven-year period two children; during six years three children, and during the last four years, four children.

The popular idea that the father, single-handed, supports his family was found true in only three-fifths of the families. In the other two-fifths, the wife or children, or both, were listed as wage-earners.

The number of children in divorced homes and the number of children living in lodging houses and hotels was very small.

Some light on the question of whether married women work because of necessity or in order to have careers is obtained through figures showing that 20 per cent. of the wives of the unskilled laborers are gainfully employed, while only 12 per cent. of the wives of the managerial and executive group are earners.

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AVIATION

Pacific Weather Favorable

True to its name, the Pacific Ocean provides more stable weather for long distance flying than the Atlantic. While the trans-Atlantic flyers had to wait for the storms to adjust themselves so as to provide the most favorable air passage, Maitland and Hegenberger and others spanning the distance from America to Hawaii could hop off with the assurance of fair weather this time of year.

Data at the U. S. Weather Bureau here show that those aviators flying westward from the mainland have the aid of favorable winds to push them on to their goal. The flight eastward from Hawaii to the mainland involves buffeting a head wind for two-thirds of the long flight.

Such a condition is just the reverse of the situation in the Atlantic. There prevailingly westerly winds give the advantage to flyers who go eastward from America to Europe.

Starting from California, the trans-Pacific aviator should expect cross-winds, neither favorable nor unfavorable, for 200 to 300 miles from the mainland. Then the trade winds, blowing northeasterly and easterly, will help the rest of the way with velocities of from 15 to 30 miles per hour.

In summer the Pacific is practically free from wind or thunderstorms. Generally, the flyers will have fair weather, although sometimes in the mid-Pacific it is cloudy and showery.

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AVIATION

Aviation Interest Takes Spurt

Due to the inspiration of recent transatlantic flights, Lindbergh himself and all the aeronautical sections of the government have been deluged with mail.

The Navy Department reports that nearly every boy in the United States wants to be an aviator now. Inquiries since Lindy's homecoming have tripled.

The Department of Commerce has had the same sort of deluge. Numerous chambers of commerce desire information regarding the opening of municipal airports.

The Army Air Service reports that requests for information have more than doubled.

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How to Use Key-Word Feature of News-Letter

In order to aid in catching the items that concern you and to facilitate clipping and filing, a key word in small capitals has been printed on the right of the line above each article. The key words used fit into any system of classification, whether it be a straight alphabetical file, a system of your own devising, the Library of Congress classification or the Dewey system.

Note that you can slip out any article without fear of damaging another article in which you might be interested, since editorial matter printed on the right-hand pages is backed by advertising, standing matter or a continuation of the article on the other side.

Library of Congress Classification

The classification of the Library of Congress has come into common use in the libraries of the country owing to the publication of the Government of the card index of all new books. We print below a list of the subject titles which are most used in the SCIENCE NEWS-LETTER. The full scheme of classification is contained in "Outline Scheme of Classes," issued by the Library of Congress.

A General Works. Polygraphy.
B Philosophy.
BF Psychology.
G Geography, voyages, travel.
GA Mathematical and astronomical geography.
GB Physical geography.
GC Oceanology and oceanography.
GF Anthropogeography.
GN Anthropology. Somatology. Ethnology. Ethnography. Prehistoric archæology.
GR Folklore.
GT Manners and customs.
GV Sports and amusements. Games.
HC Economic history and conditions. National production.
HD Economic history. Agriculture and Industries.
HE Transportation and communication.
HF Commerce.
HM Sociology. General.
HQ Family. Marriage. Woman.
HV Social pathology.
L Education.
M Music.
N Fine arts.
P Philology and linguistics.
Q Science. General.
QA Mathematics.
QB Astronomy.
QC Physics.
QD Chemistry.
QE Geology.
QH Natural history.
QK Botany.
QL Zoology.
QM Human anatomy.
QP Physiology.
QR Bacteriology.
R Medicine. General.
S Agriculture. General.
SB Field crops. Horticulture. Landscape gardening. Pests and plant diseases.
SD Forestry.
SF Animal culture. Veterinary medicine.
SH Fish culture and fisheries.
SK Hunting. Game protection.
T Technology. General.
TA Engineering. General.
TC Hydraulic engineering.
TD Sanitary and municipal engineering.
TE Roads and pavements.
TF Railroads.
TG Bridges and roofs.
TH Building construction.
TJ Mechanical engineering.
TK Electrical engineering and industries.
TL Motor vehicles. Cycles. Aeronautics.
TN Mineral industries. Mining and Metallurgy.
TP Chemical technology.
TR Photography.
TS Manufactures.
TT Trades.
TX Domestic science.
U Military science. General.
V Naval science. General.

Dewey Classification

The main divisions of the Dewey Decimal Classification, used in many libraries and by many individuals, is given below for the convenience of those who wish to use this system:

000 GENERAL WORKS—
010 Bibliography
020 Library economy
030 General cyclopedias
040 General collected essays
050 General periodicals
060 General societies
070 Newspapers
080 Special libraries. Polygraphy.
090 Book rarities
100 PHILOSOPHY—
110 Metaphysics
120 Special metaphysical topics
130 Mind and body
140 Philosophical systems
150 Mental faculties. Psychology
160 Logic
170 Ethics
180 Ancient philosophers
190 Modern philosophers
200 RELIGION—
210 Natural theology
220 Bible
230 Doctrinal. Dogmatics. Theology
240 Devotional. Practical
250 Homiletic. Pastoral. Parochial
260 Church. Institutions. Work
270 Religious history
280 Christian churches and sects
290 Ethnic. Non-Christian
300 SOCIOLOGY—
310 Statistics
320 Political science
330 Political economy
340 Law
350 Administration
360 Associations. Institutions
370 Education
380 Commerce. Communication
390 Customs. Costumes. Folklore
400 PHILOLOGY—
410 Comparative
420 English
430 German
440 French
450 Italian
460 Spanish
470 Latin
480 Greek
490 Minor Languages
500 NATURAL SCIENCE—
510 Mathematics
520 Astronomy
530 Physics
540 Chemistry
550 Geology
560 Paleontology
570 Biology
580 Botany
590 Zoology
600 USEFUL ARTS—
610 Medicine
620 Engineering
630 Agriculture
640 Domestic economy
650 Communication. Commerce
660 Chemical technology
670 Manufactures
680 Mechanic trades
690 Building
700 FINE ARTS—
710 Landscape gardening
720 Architecture
730 Sculpture
740 Drawing. Decoration. Design
750 Painting
760 Engraving
770 Photography
780 Music
790 Amusement
800 LITERATURE—
810 American
820 English
830 German
840 French
850 Italian
860 Spanish
870 Latin
880 Greek
890 Minor languages
900 HISTORY—
910 Geography and travels
920 Biography
930 Ancient history
Modern
940 Europe
950 Asia
960 Africa
970 North America
980 South America
990 Oceania and polar regions

First Glances at New Books

STARS AND ATOMS—Arthur Stanley Eddington—*Yale Univ.* ($2). Probably there is no living astronomer who speaks with as much authority on what's inside a star and how the atoms that make it up differ from those we know on the earth, as Professor Eddington, of Cambridge University. Within the last year has appeared his book, "The Internal Constitution of the Stars"—perhaps the last word on the subject. But that work is rather technical for the lay reader, though it contains brilliantly arresting passages that anyone would do well to consider. In "Stars and Atoms" he has told the same story, but told it for the general reader with all the facile style and unexpected wit that is peculiarly his. In short, it is a book to be heartily recommended to any intelligent man or woman.

Science News-Letter, July 9, 1927

THE STORY OF MATHEMATICS — Denham Larrett—*Greenberg* ($1.25). From the surveying of the Egyptians and the geometry of the Greeks the author describes how these were blended with the algebra of the Arabs to produce modern mathematical science—all in 88 pages!

Science News-Letter, July 9, 1927

THE FOUNDERS OF SEISMOLOGY—Charles Davison—*Macmillan* ($4.25). An admirable summary (in 240 pages) of the history of the study of earthquakes and the men who founded the science. Though, as might be expected, special attention is paid to the British seismologists, the work of other countries is well treated and a chapter is devoted to the study of earthquakes in the United States.

Science News-Letter, July 9, 1927

PHYSICS—M. H. Kessel—*Globe.* An outline of physics such as would be useful for reference or cramming for an examination.

Science News-Letter, July 9, 1927

THE SPRINGS OF HUMAN ACTION —Mehran K. Thomson — *Appleton* ($3). Puzzling out the motives that lie back of human conduct is one of the commonest mental problems that we set ourselves. This comprehensive discussion makes it easier to understand why the probing of motives is so often difficult.

Science News-Letter, July 9, 1927

A new kind of moving sidewalk is being tried out in Paris.

THE EVOLUTION OF CHARLES DARWIN—George A. Dorsey—*Doubleday, Page* ($2). Again the author of "Why We Behave Like Human Beings" has achieved the unusual—this time a biography written in light, vivid narrative, interrupted by those typical Dorseyan touches of biology, psychology and anthropology, showing why and how Darwin developed into the man he was. The Darwin painted here stands out, not only as a many-sided genius but as one of Dr. Dorsey's "human beings."

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HANDBOOK OF SCIENTIFIC AND TECHNICAL SOCIETIES AND INSTITUTIONS OF THE UNITED STATES AND CANADA—BULLETIN 58 OF THE NATIONAL RESEARCH COUNCIL, American Section, compiled by Clarence J. West and Callie Hull; Canadian Section, compiled by National Research Council, Canada—*National Research Council, National Academy of Sciences, Washington, D. C.* ($3). A ready guide to those societies, associations and institutions of the United States and Canada which contribute to knowledge or further research through their activities, publications or funds. Over three hundred pages, the list is not to be regarded as a selective one. Organizations directly controlled by universities have been omitted because of the forthcoming publication "American Universities and Colleges" to be issued by the American Council on Education.

Science News-Letter, July 9, 1927

YEARBOOK OF AGRICULTURE, 1926 —U. S. Department of Agriculture—*Government Printing Office* ($1.50). This is a 1300-page encyclopedia, the latest in Uncle Sam's annual editions of the word's most widely circulated agricultural book. Over 200 articles and nearly thrice as many tables give an adequate survey of agriculture today.

Science News-Letter, July 9, 1927

INVENTIONS AND PATENTS—Milton Wright — *McGraw-Hill.* For those with that universal American urge to patent, trade-mark and exploit their bright ideas, this book, by the associate editor of the *Scientific American,* is an invaluable guide and help.

Science News-Letter, July 9, 1927

BRIEF BIOLOGY—Charles Gramet—*Globe Book Co.* A large territory of science is covered here by a compact little handbook. The specimen examinations added to the text should be useful to teachers and students.

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Advice from Darwin

Quotation from "The Evolution of Charles Darwin"—George A. Dorsey—Doubleday, Page.

On two different occasions Darwin ventured, "as an old hackneyed author," to offer advice to young naturalists who were presumptive authors. I do not find this advice in books devoted to the technique of writing, but it is first-class advice and as sound and as applicable today as when written, seventy-five years ago.

He had found it a good plan, he wrote, when he could not get a difficult discussion in pleasing form, to fancy some one coming into the room and asking him what he was doing; and then to try to explain to the imaginary person what it was all about; he sometimes tried this plan on Mrs. Darwin. He also found it good to read his manuscript aloud. Then he added this bit of advice: "Strike out every word which is not quite necessary to the current subject and which could not interest a stranger. I constantly asked myself, would a stranger care for this? and struck out or left in accordingly. I think too much pains cannot be taken in making the style transparently clear and throwing eloquence to the dogs."

He wrote the young gardener, who went to India, that a paper he had submitted to him would have been better if written more simply and less elaborated—"more like your letters. It is a golden rule always to use, if possible, a short old Saxon word. Such a sentence as 'so purely dependent is the incipient plant on the specific morphological tendency' does not sound to my ears like good mother-English—it wants translating. . . . I can go on the plan of thinking every single word which can be omitted without actual loss of sense as a decided gain." Nor is he to despair about his style, he tells the gardener, although it is a little too ambitious. As for himself, he never studies style —he merely tries to get the subject as clearly as he can in his own head and then express it in the commonest language he can find. Even with the best of English writers, writing is slow work!

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A jar containing wheat grains has been found in Kish, in Mesopotamia, showing that wheat was used in bread making about 3500 B. C.

An automatic device to receive and record telephone messages when no one answers the phone has been produced by two Swedish inventors.

Science Service Books

Buy books through SCIENCE SERVICE. We have cooperated with leading book publishers, and have taken part in editing the books listed below. Just order through us—we will give you prompt and efficient service.

CHATS ON SCIENCE
By Edwin E. Slosson.
New York: The Century Company. 1924.
$2.00.

SCIENCE REMAKING THE WORLD
Edited by Otis W. Caldwell and Edwin E. Slosson.
New York: Doubleday, Page & Co. 1923.
$2.50 and $1.00.

KEEPING UP WITH SCIENCE
Edited by Edwin E. Slosson.
New York: Harcourt, Brace & Co. 1924.
$2.50.

WHY THE WEATHER?
By C. F. Brooks.
New York: Harcourt, Brace & Company. 1924.
$2.00.

SOIL AND CIVILIZATION
By Milton Whitney. Library of Modern Sciences.
New York: D. Van Nostrand Co. 1925.
$3.00.

CHEMISTRY IN MODERN LIFE
By Svante Arrhenius, translated and revised by C. S. Leonard. Library of Modern Sciences.
New York: D. Van Nostrand Co. 1925.
$3.00.

DWELLERS OF THE SEA AND SHORE
By William Crowder.
Young People's Shelf of Science. Edited by E. E. Slosson.
New York: The Macmillan Co. 1923.
$2.25.

ANIMALS OF LAND AND SEA
By Austin Clark. Library of Modern Sciences.
New York: D. Van Nostrand Co. 1925.
$3.00.

THE EARTH AND THE STARS
By C. G. Abbot. Library of Modern Sciences.
New York: D. Van Nostrand Co. 1925.
$3.00.

MYSTERY OF MIND
By Leonard Troland. Library of Modern Sciences.
New York: D. Van Nostrand Co. 1926.
$3.00.

FOUNDATIONS OF THE UNIVERSE
By M. Luckiesh. Library of Modern Sciences.
New York: D. Van Nostrand Co. 1925.
$3.00.

CHEMISTRY IN THE WORLD'S WORK
By H. E. Howe. Library of Modern Sciences.
New York: D. Van Nostrand Co. 1926.
$3.00.

EVERYDAY MYSTERIES
By Charles Greeley Abbot.
Young People's Shelf of Science. Edited by E. E. Slosson.
New York: The Macmillan Co. 1923.
$2.00.

STORIES IN STONE
By Willis T. Lee. Library of Modern Sciences.
New York: D. Van Nostrand Co. 1926.
$3.00

Any book listed above—or any book in print—will be sent to any address on receipt of list price plus postage.

SCIENCE SERVICE

21st and B Streets, N. W. **Washington, D. C.**

Anniversaries of Science

July 14, 1907—Sir William Henry Perkin died. He discovered the first of the aniline dyes in 1856, and became the founder of the coal-tar dye industry.

Some have described Perkin's discovery as accidental. Perhaps it was. But consider the way it was perfected and made available; consider with what extraordinary ability every related topic was handled; consider how every move was a new move, with no previous experience to guide him, and who but one endowed with the quality of genius could have overcome all this? Hertz discovered the key to wireless telegraphy, but Marconi brought it within reach of all of us; Baeyer first synthesized indigo, but the combined labors of chemists in the largest chemical factory in the world were necessary before artificial indigo began to compete with the natural product; Perkin both isolated the first artificial dyestuffs and made it useful to man.

—Harrow: *Eminent Chemists of Our Time.*

Science News-Letter, July 9, 1927

July 15, 1662—The Royal Society of England was granted a charter.

Some twenty years before the outbreak of the plague (1665), says Huxley, a few calm and thoughtful students banded themselves together for the purpose, as they phrased it, of "improving natural knowledge." The ends they proposed to attain cannot be stated more clearly than in the words of one of the founders of the organization:

"Our busines was (precluding matters of theology and state affairs) to discourse and consider of philosophical enquiries and such as related thereunto, as Physick, Anatomy, Geometry, Astronomy, Navigation, Staticks, Magneticks, Chymicks, Mechanicks, and Natural Experiments; with the state of these studies and their cultivation at home and abroad. We then discoursed on the circulation of the blood, the valves in the veins, the *venae lacteae*, the lymphatic vessels, the Copernican hypothesis, the nature of comets and new stars, the satellites of Jupiter, the oval shape (as it then appeared) of Saturn, the spots on the sun and its turning on its own axis, the inequalities and selenography of the moon, the several phases of Venus and Mercury, the improvement of telescopes and grinding of glasses for that purpose, the weight of air, the possibility or impossibility of vacuities and nature's abhorrence thereof, the Torricellian experiment in quicksilver, the descent of heavy bodies and the degree of acceleration therein, with diverse other things of like nature, some of which were then but new discoveries, and others not so generally known and embraced as now they are, with other things appertaining to what hath been called the New Philosophy, which from the times of Galileo at Florence and Sir Francis Bacon (Lord Verulam) in England, hath been much cultivated in Italy, France, Germany and other parts abroad, as well as with us in England."

The learned Dr. Wallis, writing in 1696 narrates in these words what happened half a century before, or about 1645.

Science News-Letter, July 9, 1927

July 16, 1798—The Marine Hospital Service for seamen of the American Merchant Marine was authorized by Congress. From this has grown the U. S. Public Health Service.

Up until the early eighties of the last century quarantine measures were entirely administered by state and local authorities. The *Annual Report* of the Surgeon General of the Marine Hospital Service for the year 1872, however, refers to an order of the Secretary of the Treasury in which the attention of Marine Hospital Service officers, customs officials and revenue officers was directed to the provisions of the Act of February 25, 1799, which enjoined Federal officers to cooperate in the enforcement of quarantine laws and regulations.

On account of their duties in caring for sick seamen, officers of the Marine Hospital Service began to evince more and more interest in epidemics introduced through vessels from infected ports, and this was especially so with respect to yellow fever. . . . In 1882 an epidemic fund was created by Congress to aid local authorities in suppressing epidemics, and from that time on a similar appropriation became an established custom.

—Hugh S. Cumming, in *A Half Century of Public Health.*

Science News-Letter, July 9, 1927

GENERAL SCIENCE

Altruism

The God of things that are
  Is the God of the highest heaven;
The God of the morning star,
  Of the thrush that sings at even;
The God of the storm and sunshine,
  Of the wolf, the snail, and the bee,
Of the Alps' majestic silence,
  Of the soundless depths of the sea;

The God of the times and the nations,
  Of the planets as they roll,
Of the numberless constellations,
  Of the limitless human soul.
For there is nothing small,
  And naught can mighty be;
Archangels and atoms all—
  Embodiments of Thee!

A single thought divine
  Holds stars and suns in space;
A dream of man is Thine,
  And history finds its place,
When the universe was young,
  Thine was the Perfect Thought
That life should be bound in one
  By the strand of Love enwrought.

In the life of the fern and the lily,
  Of the dragon and the dove,
Still through the stress and struggle
  Waxes the bond of love.
Out from the ruthless ages
  Rises, like incense mild,
The love of the man and the woman,
  The love of the mother and child.

—David Starr Jordan:
Days of a Man.

Science News-Letter, July 9, 1927

CHEMISTRY

Cellulose Photo Films

Cellulose, the principal constituent of wood fiber, may revolutionize photographic methods by its use in photographic films. A new process has just been developed by Philippe David, collaborator of A. Bertillon, famous criminologist, by means of which it takes the place of gelatin as a support for the sensitive silver salts.

In the ordinary photographic plate of film the base of glass or celluloid is coated with a layer of gelatin, in which are suspended the silver bromide particles. The gelatin layer is rather delicate, and great care must be taken with the films or plates before they are dry. Too much heat will melt the coating and spoil the picture.

With the new films gelatin and its disadvantages are eliminated. As the cellulose does not dissolve, even in boiling water, the developing chemicals may be used hot to speed up the process. They may be developed in 3 to 4 minutes, fixed in 2 minutes and washed in 30 seconds, instead of the 15 to 30 minutes that the latter process now takes. Then they can be dried over a flame or in a hot oven in 2 or 3 minutes. The entire process, from the start of development to the dry negative ready for printing, is over in 10 minutes at the most. This is a far shorter period than can be obtained at present, and it is anticipated that the new films and plates will prove especially valuable, both for still and motion pictures, in portraying news events.

Science News-Letter, July 9, 1927

RELIGION

Scientific Religion

Seven of the fifty important religious books of 1926-7, selected by widely representative librarians and the American Library Association, are related in some way to science:

Brown, W. A. *Life of prayer in a world of science.* Scribner. $2.25.

Browne, Lewis. *This believing world.* Macmillan. $3.50.

Hickman, E. S. *Students' introduction to the psychology of religion.* Abingdon. $3.50.

Newman, H. H. *Nature of the world and of man.* University of Chicago Press, $4.00.

Streeter, B. H. *Reality; a new correlation of science and religion.* Macmillan. $2.50.

Watson, G. B. and G. H. *Case studies for teachers of religion.* Association Press. $3.00.

Whitehead, A. N. *Religion in the making.* Macmillan. $1.50.

Science News-Letter, July 9, 1927